Time Dependent Valuation (TDV)

Description

Time dependent valuation (TDV) is an alternative to source energy as the currency for evaluating building energy performance. Unlike source energy, TDV accounts for *when* energy is used. Measures that save energy during periods when TDV is high will be credited more than measures that save energy when TDV is low. For electricity, TDV is high during hot summer afternoons and low during colder temperatures, typically at night. TDV is intended to track real-time electricity prices.

For gas and propane, the variations are more seasonal, with values lower in summer and higher in winter. TDV values closely mirror the prices that consumers pay for energy and more accurately reflect the monetary benefits to building owners from energy savings. TDV would be implemented in approved performance calculation methods. No additional inputs or data requirements would be necessary for using programs that incorporate TDV. The ACMs would look essentially the same.

TDV would affect both the residential and nonresidential *Standards* and would affect the way all measures are credited in the compliance process when the performance method is used.

Benefits

Insofar as the performance standards are used to optimize energy performance, using TDV would produce buildings that have smaller peak power requirements. Since energy used during peak periods is valued more, a premium would be placed on saving it. The corollary is that measures increasing energy consumption when TDV is high would be penalized, and it would be more difficult to achieve compliance with such measures.

Buildings optimized under TDV would be less expensive to operate since more energy would be saved during periods when prices are high.

Environmental Impact

If TDV results in a shift in consumption from peak periods to off peak periods, then this would reduce the use of peaking plants and increase the use of baseload power plants.

Type of Change

TDV would be implemented primarily as a modeling change. The TDV rules would be documented in the Residential and Nonresidential ACM Approval Manuals. In addition, the *Standards* would need to be updated in several places, as shown below:

§101 Definitions has terms for Energy Budget and Source Energy that would need to be modified.

§102 Calculation Of Source Energy Consumption would need to be modified. This section has Table 1-B with the source energy conversion rates.

The term source energy or source energy consumption is used throughout the *Standards*. This would be changed to TDV energy or to another suitable term.

The ACM rule changes would include detailed data on TDV multipliers or TDV energy for each hour of the year. TDV will also likely vary with climate and building type (residential vs. nonresidential). A considerable amount of data is contained in the current TDV proposal. It would be best if this data were distributed through electronic means rather than by publishing it in the ACM Manuals. The electronic documents would then become an extension of the print documents.

Measure Availability and Cost

The ACM vendors would implement TDV. EnerComp is the program vendor for MICROPAS. EnergySoft is the program vendor for EnergyPro. These program vendors have the market share for residential and

nonresidential compliance software, respectively. EnerComp already has a research version of its program that implements TDV. No version of EnergyPro directly implements TDV, but the program has the capability to create output files that can be processed by TDV spreadsheets.

The ACM program vendors already update their software every three years to address regularly scheduled code changes. TDV would be one more code change that would need to be addressed on the normal three-year cycle. Many other code changes have taken place in the past, which have triggered ACM changes comparable to TDV.

TDV would also need to be implemented in the CEC "public domain" computer programs for residential and nonresidential standards. This would be the responsibility of the CEC staff or its contractors.

Useful Life, Persistence and Maintenance

N/A

Performance Verification

N/A

Cost Effectiveness

This topic is not applicable for TDV as long as TDV is only used in the compliance process. Some have proposed that TDV also be used to show that the standards are cost effective. If TDV is used to determine the *Standards* cost effectiveness, then measures that are more effective at reducing energy during peak periods would more likely be included in the *Standards*. Ultimately, the mix of requirements and measures included in the *Standards* could morph to a new set that is more sensitive to peak energy consumption.

Analysis Tools

TDV is not a measure, like wall insulation, that needs a tool to analyze it. TDV is itself a tool, which would be implemented in ACMs (see above).

Relationship to Other Measures

TDV affects all measures used for compliance or considered to be included in the *Standards*.

Bibliography and Other Research

Much of the research on TDV was supported by PG&E. Two reports are available as shown below:

Time Dependent Valuation of Energy for Developing Building Efficiency Standards, Summary Report, December 6, 2000.

Dollar-Based Performance Standards For Building Energy Efficiency, Final Report, March 25, 1999.